(AE)

PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventors: ARTHUR LINNERT GORDON SHORT and MICHAEL AXSON

957,161

957,161

Date of filing Complete Specification (under Section 3 (3) of the Patents Act, 1949) Jan. 7, 1960.

Application Date Oct. 7, 1958. *No. 31909/58.*

Application Date April 10, 1959. *No. 12129/59.*

Complete Specification Published May 6, 1964.

© Crown Copyright 1964.

Index at acceptance:—**B8 S3D**

International Classification:—**B 65 g**

COMPLETE SPECIFICATION

Article Feeding Machine

We, THE COTTON SILK & MAN MADE FIBRES RESEARCH ASSOCIATION, formerly known as The British Cotton Industry Research Association, a British Association of Shirley Institute, Didsbury, Manchester 20, in the County of Lancaster, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns article feeding machines.

The principal object of the present invention is to provide a machine which will receive a random supply of articles, align them and deliver them one by one at a delivery station, and, in such a machine, to achieve a substantial feed rate without exerting too vigorous a mechanical action on the articles.

According to the present invention an article feeding machine is adapted to accept a random supply of articles, to cause the articles to be conveyed and delivered one by one at a delivery station, and includes a rotatably-mounted, inclined circular platform having a rotatably-mounted circular disc of a smaller diameter superimposed thereupon and adapted, when rotated at a speed greater than that of said platform, to urge articles fed upon said disc toward the peripheral region of the said platform, whereat to be conveyed and delivered by said platform one by one at the delivery station.

Also according to the present invention an article feeding machine is adapted to accept a random supply of articles, align them, and deliver them one by one at a delivery rotation, and includes a rotatably-mounted, inclined circular platform having a rotatably-mounted circular disc of smaller diameter, superimposed thereupon and adapted, when rotated at a speed greater than that of said platform, to urge articles fed upon said disc toward the peripheral region of the said platform, whereat to be aligned and to be conveyed and delivered by said platform one by one at the delivery station.

More particularly according to the invention an article feeding machine for feeding a random supply of articles of generally cylindrical and elongated form, especially cops or bobbins of yarn when positioned in end-to-end alignment to a delivery station comprises in combination a rotatably-mounted, inclined circular plate, a stationary guide extending around the whole of the peripheral region thereof except at the delivery station at the high edge of the plate, the peripheral region of the plate being shaped so as to form in association with the guide a conveying track for articles in end-to-end alignment, and also comprising a disc mounted to rotate whilst positioned above the upper surface of the plate, all arranged and disposed so that with the disc rotating faster than the plate, the articles supplied in random disposition to the lower part of the plate are cause to be flung to the peripheral region of the plate by the disc, and there aligned end-to-end in the track and conveyed to the delivery station. The machine will usually include conveyor means beneath the delivery station arranged to convey the articles away in substantially regular succession, and conveyor means above the plate arranged to bring the random supply of articles thereto. Preferably the random supply will, when operative, be arranged to be excessive, and in this case suitable means will be provided for detecting the presence of a given weight of articles on the platform, and then temporarily interrupting the supply thereof whereby with a potentially excessive supply of articles of substantially equal weight an

[*Price* ~~4s. 6d.~~]

actual average rate of supply equal to the delivery rate may be maintained.

Furthermore, according to the invention, the feeding machine may have provided therefor control means for a gate at the delivery station, said control means being so sensitive to the movement of articles from the delivery station past a given point that the gate will be closed as necessary to prevent the passage of successive articles from the delivery station within less than a predetermined time interval.

Preferably the control means consists of a photo-electric cell disposed adjacent the delivery station and adapted to operate a relay on movement of an article coming from the delivery station into the range of the cell, said relay then closing the gate for an appropriate period.

The invention will now be described further, by way of example, only, with reference to the accompanying drawings which show one embodiment thereof and in which:—

Fig. 1 is a perspective view showing the general arrangement and operation of a machine according to the invention;

Fig. 2 is a plan view of one end of the machine shown in Fig. 1 (the table or platform thereof being shown untilted for the sake of clarity);

Fig. 3 is a side elevation of the machine showing the same end as shown in Fig. 2, the table or platform in this case being shown in its operative, tilted position;

Fig. 4 is an end elevation corresponding to Fig. 3;

Fig. 5 is a section along line V—V of Fig. 2, with certain parts omitted for the sake of clarity; and

Fig. 6 is an enlarged view of the gate and control means therefor.

Referring now to Fig. 1 the machine consists basically of means 11 for feeding a random supply of packages P, an inclined table or platform 12 for accepting the random supply, and for aligning and conveying the articles one by one to a delivery station 32 and means 13 for conveying the articles in regular succession from the delivery station 32 to a check-weighing machine (not shown). The delivery station has a control gate 40 operated by a photo-electric cell arrangement 47.

The means 11 for conveying the random supply to the platform 12 includes an inclined creeper lattice 14 disposed above the platform in such position that the packages fall from the upper extremity thereof via a chute 14*a* onto the lower part of the platform. The platform 12 has three main parts, namely, a rotatably mounted circular plate 15 disposed at an inclination of about 15° to the horizontal, a smaller, rotatably mounted circular disc 16, and a fixed guide 17 around the plate 15.

Referring now also to Figs. 2 to 5, the platform 12 is supported in a suitable cradle framework 18, said cradle being pivotable in bearings 19, 20 in the machine framework, thus to allow of a variation in inclination of the platform 12 when desired, the machine framework being designated generally by the reference numeral 21.

The plate 15 is wooden and of substantial diameter, say about two feet, and its periphery is bevelled at an angle in excess of the angle of inclination of the plate in a manner and for a purpose which will be described in more detail hereinafter.

The plate 15 is rotated by virtue of the rotation of a carrier plate 22 upon which it is carried, the rotational motion of said carrier plate 22 being transmitted to the plate 15 by the engagement of a plurality of pegs 23 adjacent the periphery of the carrier plate with complementary blind holes 24 in the underside of the plate 15. The vertical position of the carrier plate 22 is determined by three wheels 25 upon which the plate is supported; the horizontal position determined by horizontally disposed wheels 26.

Motion of the carrier plate 22 is derived from a shaft 27 to the lower end of which is secured a bevel gear 28, said gear 28 being in engagement with a complementary gear 29 at the end of a driving shaft 30. The shaft 30 is driven by electric motor 30*a* through a suitable transmission (see Fig. 2).

The plate 15 is almost wholly surrounded by the fixed guide 17, said guide being in the form of a sheet metal wall, a few inches high, perpendicular to the plane of the plate. One end 17*a* of the guide 17 extends to the highest point of the plate 15; the other end 17*b* also approaches the highest point, an opening 31 being left at a delivery station 32 as will hereafter be apparent. The vertical wall formed by the guide, in combination with the bevelled edge of the plate 15 is arranged to form a track T in which packages will be introduced, aligned and retained, and, due to rotation of the plate, conveyed to the delivery station 32, there to pass substantially tangentially from the plate. Thus, the horizontal extent of the bevelled region will be greater than the radius of the packages, but preferably less than the diameter thereof. The guide also serves to retain unaligned packages within the area of the plate surface.

The smaller disc 16, which is of rubber backed by a reinforcing plate 33 of metal, is rotatably mounted eccentrically relative to the plate 15, just above and parallel to the surface of the latter, and suitable means 34 are provided for driving the disc 16 at a higher angular velocity than the plate 15. The location of the disc 16 is important, for its function is to urge packages from the random mass coming onto the platform from the supply to the periphery of the plate, so that they become aligned in end-to-end disposition in the track. We have found that good results are obtained when the periphery of the disc 16 is fairly close to the periphery of the plate 15, but not closer than the diameter of the packages, and, when considering the arrangement in plan view, with the highest point of the platform 12 on the extreme left and the plate 15 and the disc 16 rotating in the clockwise sense, the axis of rotation of the disc 16 passes through the lower right hand quadrant of the plate 15.

Beneath the edge region of the plate at the delivery station 32 the conveyor means 13 is disposed, whereby the articles may be conveyed away after being discharged from the plate 15 through the opening 31 in the guide 17 to a check weighing machine (not shown). The conveyor means 13 is conveniently in the form of two spaced apart parallel endless bands 35, the packages being supported by and between said bands.

It is desirable for the supply to the weighing machine, when functioning, to be in excess of the delivery capacity of the machine, and, in order to maintain an average rate of supply which is equal to the delivery rate, means are provided to render the feed conveyor inoperative from time to time.

In the embodiment being described the plate 15 is supported upon three wheels 36, 37 and 38 carrier by framework 18, one of said wheels 36 being adapted to actuate a micro-switch and thereby to stop the means driving the inclined lattice 14, said lattice having ratchet means 39 therefore to prevent reverse motion. The actuation of the micro-switch is arranged to be consequent upon the pivotal motion of the table 15 about the axis defined by the line joining the points of contact of the wheels 37, 38 upon the excessive loading of the table in the region of wheel 36. The table 15 will subsequently assume its original position when further packages have been drawn off and thus the motion of the lattice 14 will recommence.

In order that the delivery of packages from the machine to the weighing station shall not exceed a given required rate, means are provided whereby the rate of discharge of articles through the opening 31 at the delivery station 32 may be controlled. (see now Figs. 1 and 6 particularly).

The means comprise a gate 40 adapted to be opened or closed under the control of a photo-electrically actuated solenoid 41. The gate 40 is mounted at the upper end of a shaft 42 supported in journals secured to the cradle 18. The gate 40 is formed from two elements 40*a*, 40*b* one of which 40*a* is secured to the shaft 42 by means of flanges and the other 40*b* forms a lip at the remote end of the first element, the second 40*b* extending into the path taken by the packages during progression thereof to the delivery station thus to prevent further discharge of the package. The lower end of the shaft 42 carries an arm 43 rigidly secured transversely thereof, said arm 43 having pivotally connected to the remote end thereof a connecting rod 44 pivotally secured to the core 45 of solenoid 41. A further arm 46 is firmly secured to the lower end of the shaft 42 and has a helical tension spring 48 secured between the remote end thereof and a fixed point of the cradle framework.

The actuation of the solenoid 41 is controlled by means of an arrangement 47 comprising a photo-electric cell 47*a* disposed beneath the conveyor, and a source 47*b* adapted to project a beam of light onto said cell. The light beam is interrupted upon the passage therethrough of a package.

The cell is just one article length distant from the gate and the speed of the conveyor is adjusted so that the time of passage of one article past a given point is equal to the minimum time interval between successive articles fed by the machine. The solenoid is so dependent upon the output of the photo-electric cell that the gate will be closed whenever there is an article in the field of the cell, the gate being opened when the article moves from the field. Therefore, it will be obvious that with the conveyor speed such that one of the articles will take half a second to pass a given point, a maximum article feed of one per second will be achieved.

In operation the machine just described gives a regular feed of packages to the conveyor passing beneath the delivery station, and this can easily be arranged to pass packages to the check-weighing machine at time intervals which will ensure that the check-weighing machine at, or near, its maximum output. The random supply of packages P falls onto the lower part of the platform 12 from the feed conveyor 14, and the action of the disc 16, which, as mentioned rotates at a higher angular velocity than the plate 15, is to cause packages thereon to move under the action of centrifugal force towards the periphery of the plate 15. When there is room for such a package in the track T formed by the edge of the plate 15 and the guide 17, it will quickly become longitudinally aligned therein and be conveyed, so oriented, to the delivery station 32. When a package cannot be accommodated in the track it will be carried completely round by the plate 15 before falling back to the lower part of the platform 12. In either event it will reach the disc 16 again and will be thrown again towards the periphery of the plate 15 to seek a place in the track.

At the delivery station, assuming the gate 40 to be open, the packages fall, by gravity, off the bevelled edge of the plate 15 onto the conveyor means 13 beneath, to be carried away to the check-weighing machine.

As already described the feed conveyor will stop from time to time to prevent overloading of the platform.

It will be noted that the rate at which packages reach the delivery station will depend on the speeds of plate and disc, and that the action of the machine need not be unduly vigorous.

Should it be required, the articles discharged from the delivery station and travelling along the conveyor may be sorted to detect and reject non-uniform articles. A suitable device for effecting such sorting forms the subject of our co-pending British application No. 23713/59 (Serial no 957162) in which is described a switch means so disposed and arranged in the path of the articles as to be sensitive to any premature departure from a straight line contour, the switch means then being effective to operate means for rejecting the article concerned.

The invention is by no means limited to the precise details of the embodiment hereinbefore particularly described. The contours of the track may be varied, for example to accommodate different shapes of articles; the delivery conveyor or other delivery means may be differently arranged, such as, for instance, to take off the packages side-by-side instead of end-to-end; the overload detection may be in the form of a probe or, alternatively, an arrangement actuated by displacement of the guide by the packages; or the delivery may be to other than a checkweighing machine.

In one alternative arrangement the disc is arranged concentrically with respect to the plate which simplifies the driving arrangements and facilitates its disposition in a recess in the plate.

Furthermore the relay or control means for the gate may be positively timed, the opening of the gate being for predetermined constant intervals of time, such an arrangement allowing of the delivery of articles of various lengths.

Whilst it is possible to adjust the machine to cater for packages of different dimensions by varying the position of the guide relative to the centre of the plate, an alternative arrangement is to keep the guide in a fixed position and to use one of a series of plates of different diameter.

WHAT WE CLAIM IS:—

1. An article feeding machine adapted to receive a random supply of articles to cause the articles to be conveyed and delivered one by one at a delivery station, including a rotatably-mounted inclined circular platform having a rotatably-mounted circular disc of smaller diameter superimposed thereupon and adapted, when rotated at a speed greater than that of said platform, to urge articles fed upon said disc toward the peripheral region of the said platform, whereat to be conveyed and delivered by said platform one by one at the delivery station.

2. An article feeding machine adapted to receive a random supply of articles, align them, and deliver them one by one at a delivery station, including a rotatably-mounted, inclined circular platform having a rotatably-mounted circular disc of smaller diameter superimposed thereupon and adapted, when rotated at a speed greater than that of said platform, to urge articles fed upon said disc toward the peripheral region of said platform, whereat to be aligned and to be conveyed and delivered by said platform one by one at the delivery station.

3. An article feeding machine for feeding a random supply of articles of generally cylindrical and elongated form, especially cops or bobbins of yarn, when positioned in end-to-end alignment to a delivery station comprising in combination a rotatably-mounted, inclined circular plate, a stationary guide extending around the whole of the peripheral region thereof except at the delivery station at the high edge of the plate, the peripheral region of the plate being shaped so as to form, in associated with the guide, a conveying track for articles in end-to-end alignment and also comprising a disc mounted to rotate whilst positioned above the upper surface of the plate, all arranged and disposed so that, with the disc rotating faster than the plate, the articles supplied in random disposition to the lower part of the plate are caused to be flung to the peripheral region of the plate by the disc and there aligned end-to-end in the track and conveyed to the delivery station.

4. An article feeding machine as claimed in claim 1, 2 or 3, including conveyor means beneath the delivery station arranged to convey the articles away in substantially regular succession.

5. An article feeding machine as claimed in any one of the preceding claims including conveyor means above the plate arranged to bring the random supply of articles thereto.

6. An article feeding machine as claimed in any one of the preceding claims in which means are provided for detecting the presence of a given weight of articles on the platform, and then temporarily interrupting the supply thereof whereby, with a potentially excessive supply of articles of substantially equal weight an actual average rate of supply equal to the delivery rate may be maintained.

7. An atricle feeding machine as claimed in claim 6 in which the supply of articles is temporarily interrupted as a consequence of the limited pivotal motion of the platform about an horizontally disposed axis thereby to actuate a control means for the stoppage of the supply of articles.

8. An article feeding machine as claimed in claim 7 in which said platform is supported

upon three vertically disposed wheels, one of which wheels is adapted to be displaced by said platform thus to allow limited pivotal motion thereof.

9. An article feeding machine as claimed in claim 3 in which the supply of articles fed to the platform is adapted to be temporarily interrupted upon displacement of the guide under said given weight, such displacement actuating control means for the stoppage of the supply.

10. An article feeding machine as claimed in claims 7, 8 or 9 in which said control means (e.g. a micro-switch) is adapted to stop the motion of a moving element whereby the articles are progressed and supplied to the platform.

11. An article feeding machine as claimed in any one of the preceding claims in which control means are provided for a gate at the delivery station, said control means being so sensitive to the movement of the articles from the delivery station past a given point that the gate will be closed as necessary to prevent the passage of successive articles from the delivery station within less than a predetermined time interval.

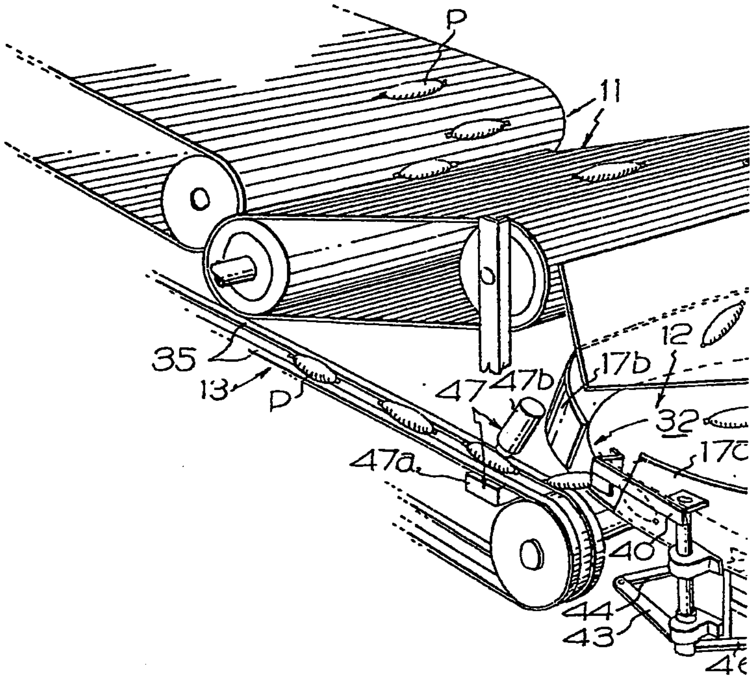
12. An article feeding machine as claimed in claim 11 in which said control means consists of a photo-electric cell disposed adjacent the delivery station and adapted to operate a relay on movement of an article coming from the delivery station into the range of the cell, said relay then closing gate for an appropriate period.

13. An article feeding machine as claimed in any one of claims 1 to 10 in which control means are provided for a gate at the delivery station said control means being positively timed so that said gate is opened for predetermined intervals of time.

14. An article feeding machine substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

For the Applicants:
E. K. DUTTON & CO.,
Chartered Patent Agents,
57, Market Street,
Manchester, 1.

Leamington Spa: Printed for Her Majesty's Stationery Office by the Courier Press.—1964.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.


P
P

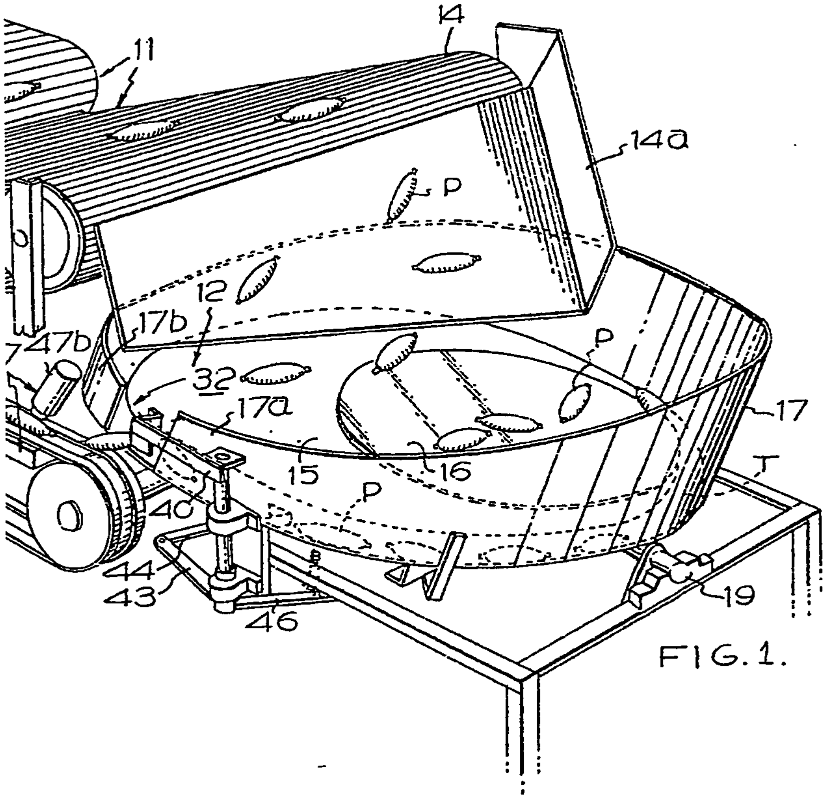


FIG. 1.

957,161
5 SHEETS

COMPLETE SPECIFICATION
This drawing is a reproduction of the Original on a reduced scale.
SHEET 1

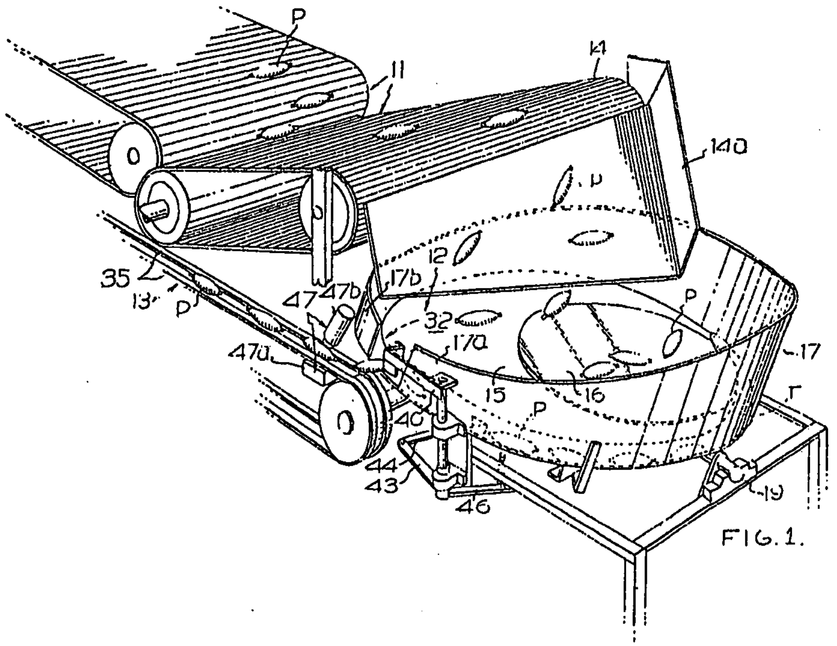
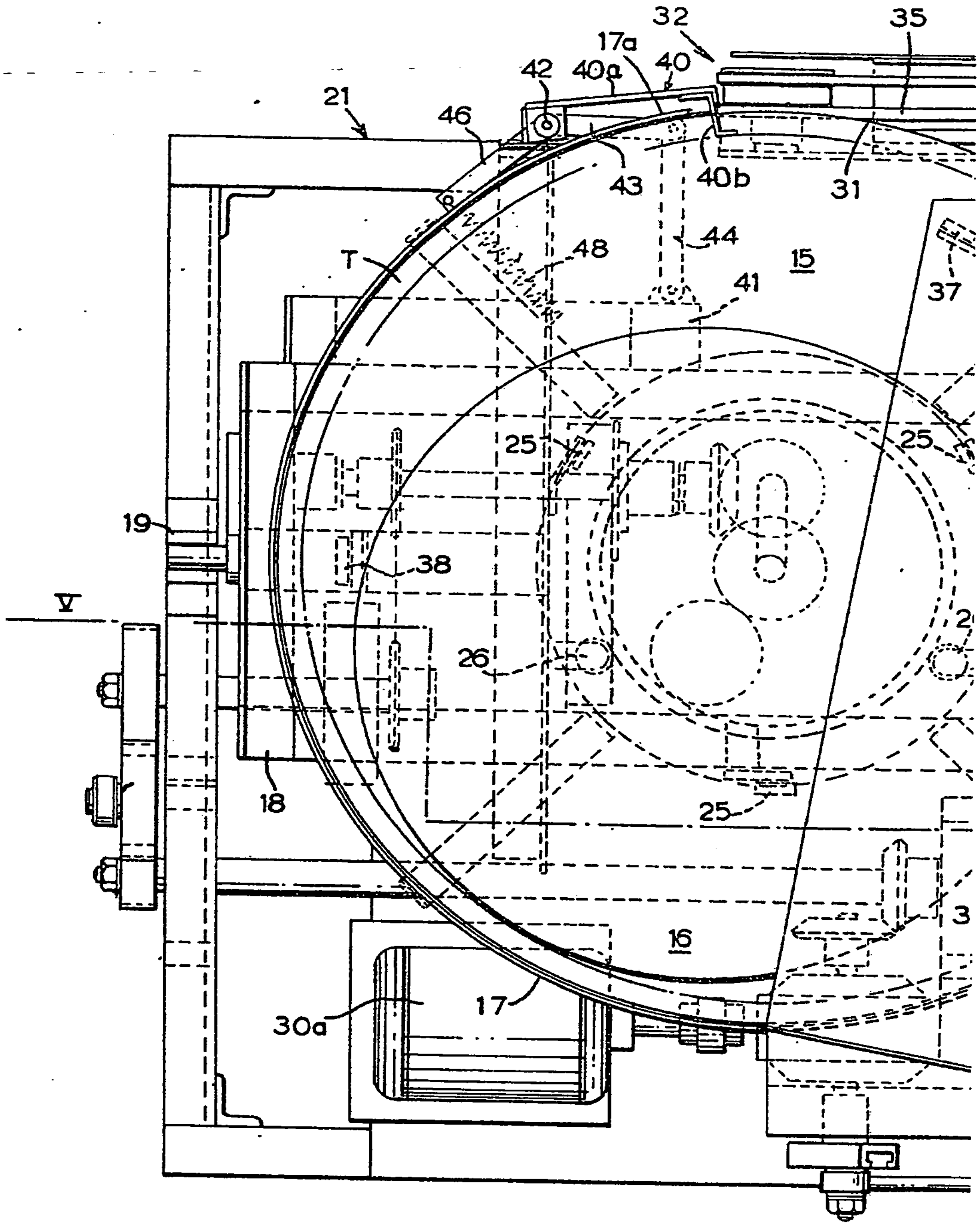


FIG. 1.


T
V

957,161 5 SHEETS

COMPLETE SPECIFICATION

This drawing is a reproduction of the Original on a reduced scale.

SHEET 2

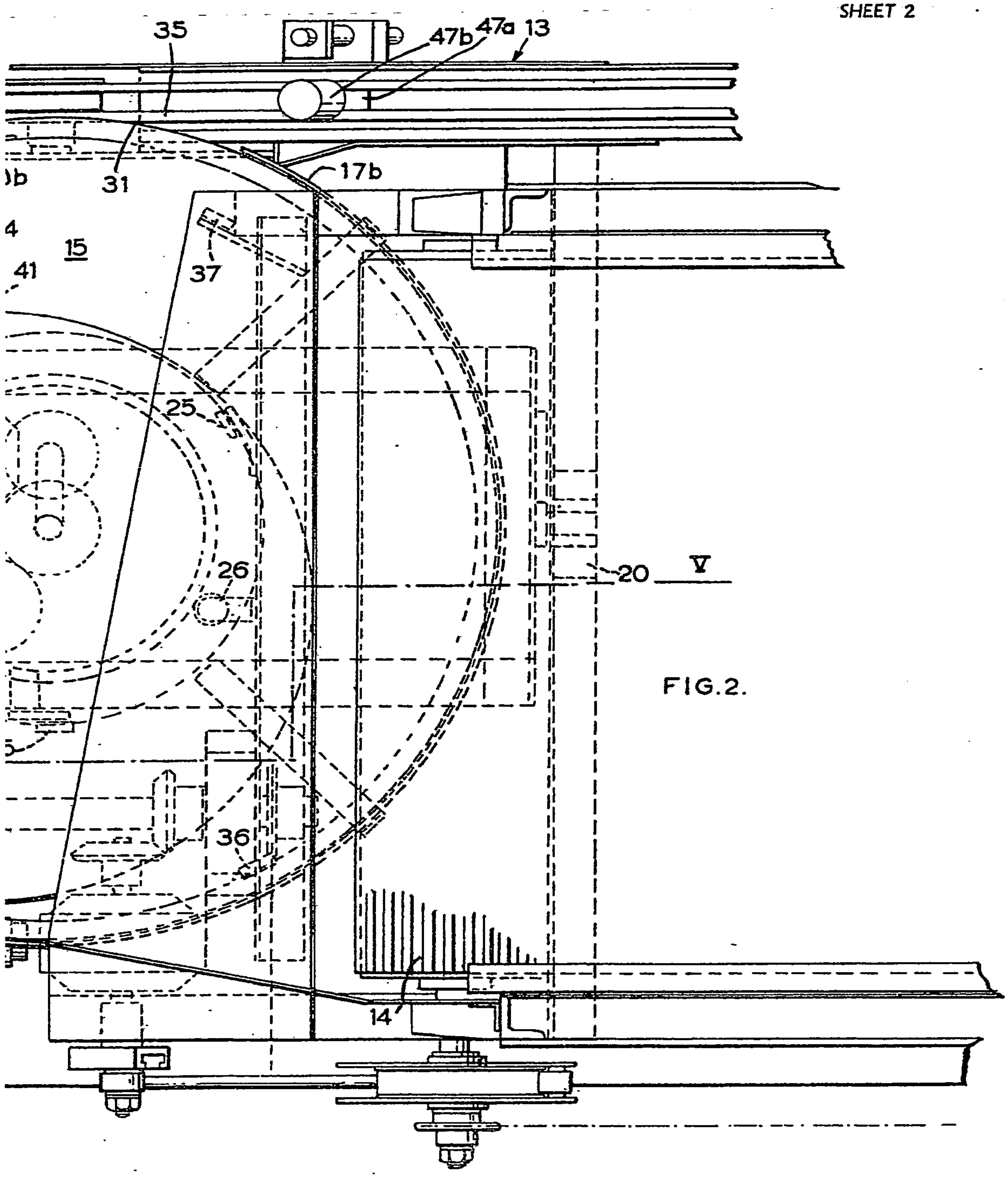


FIG.2.

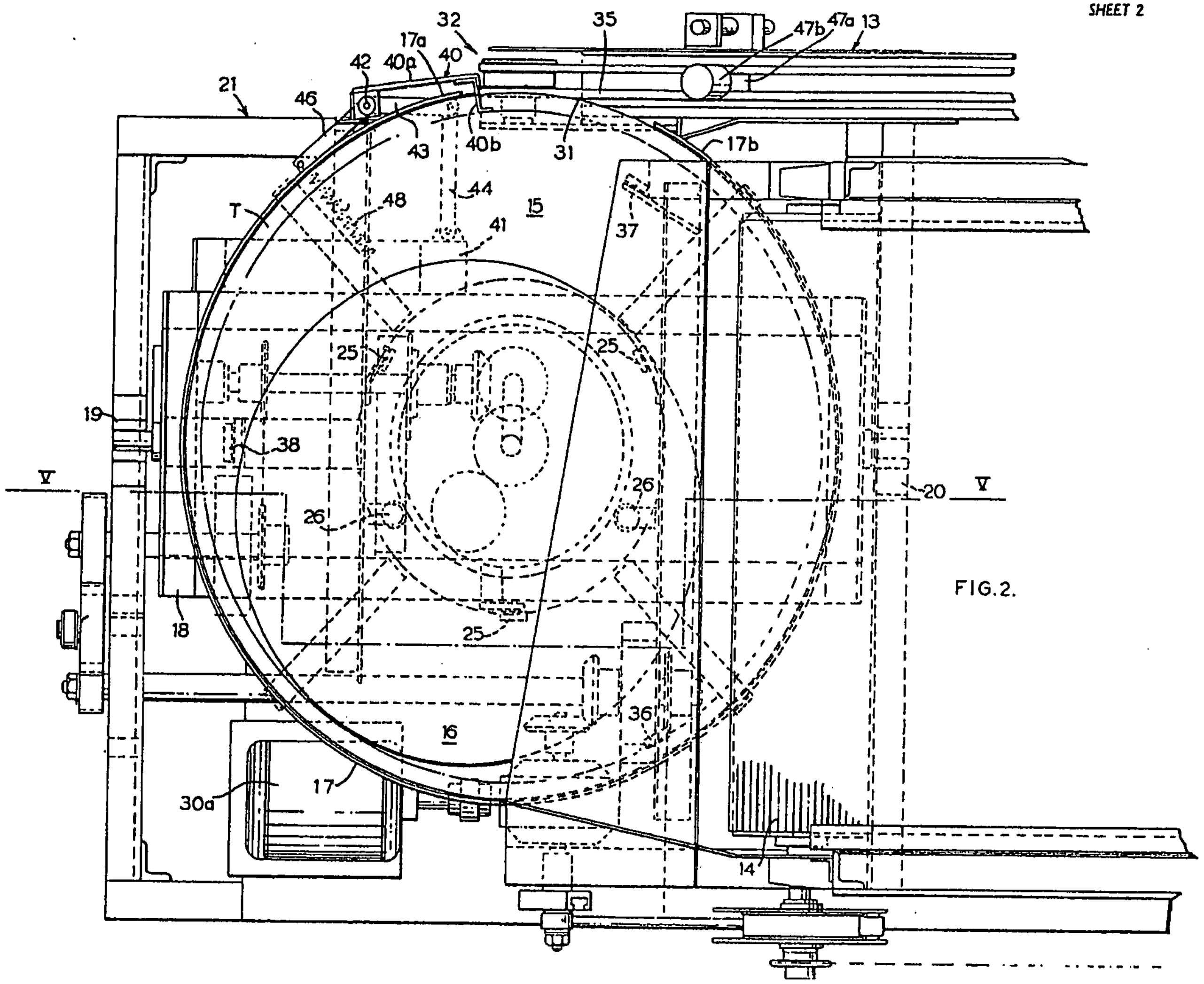
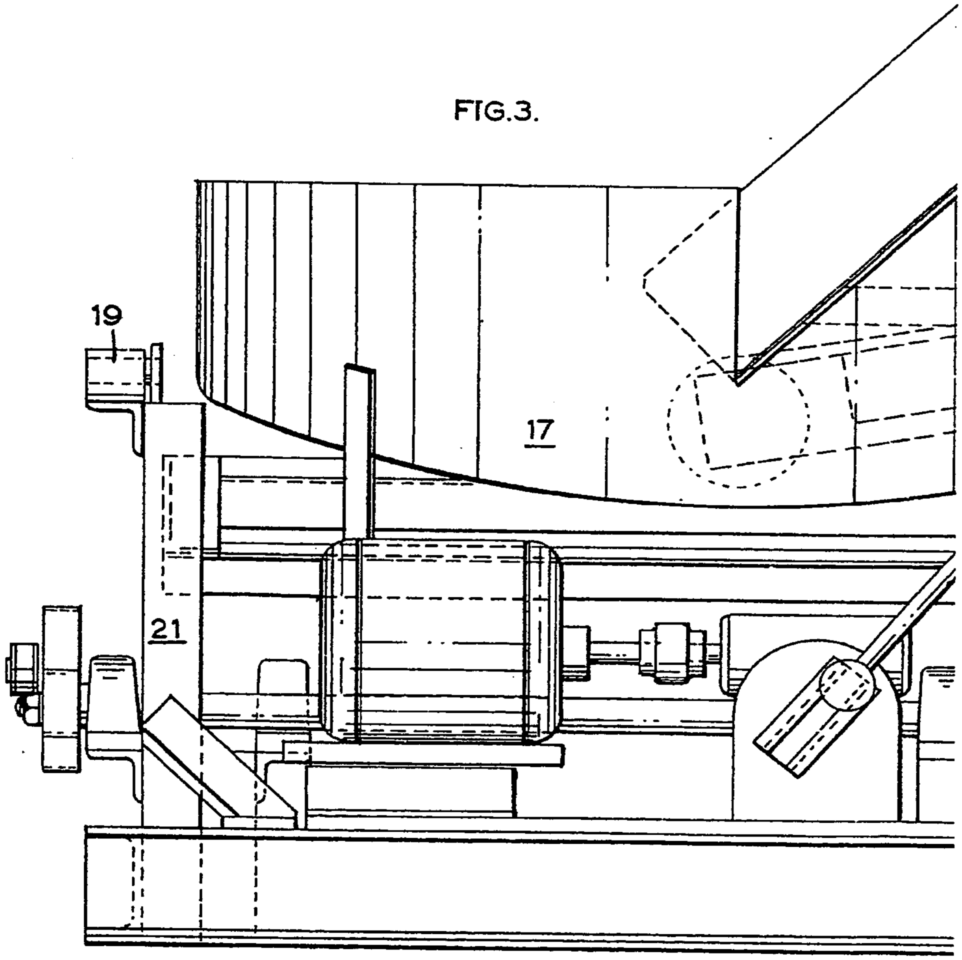

T
V
V

FIG. 2.

FIG.3.



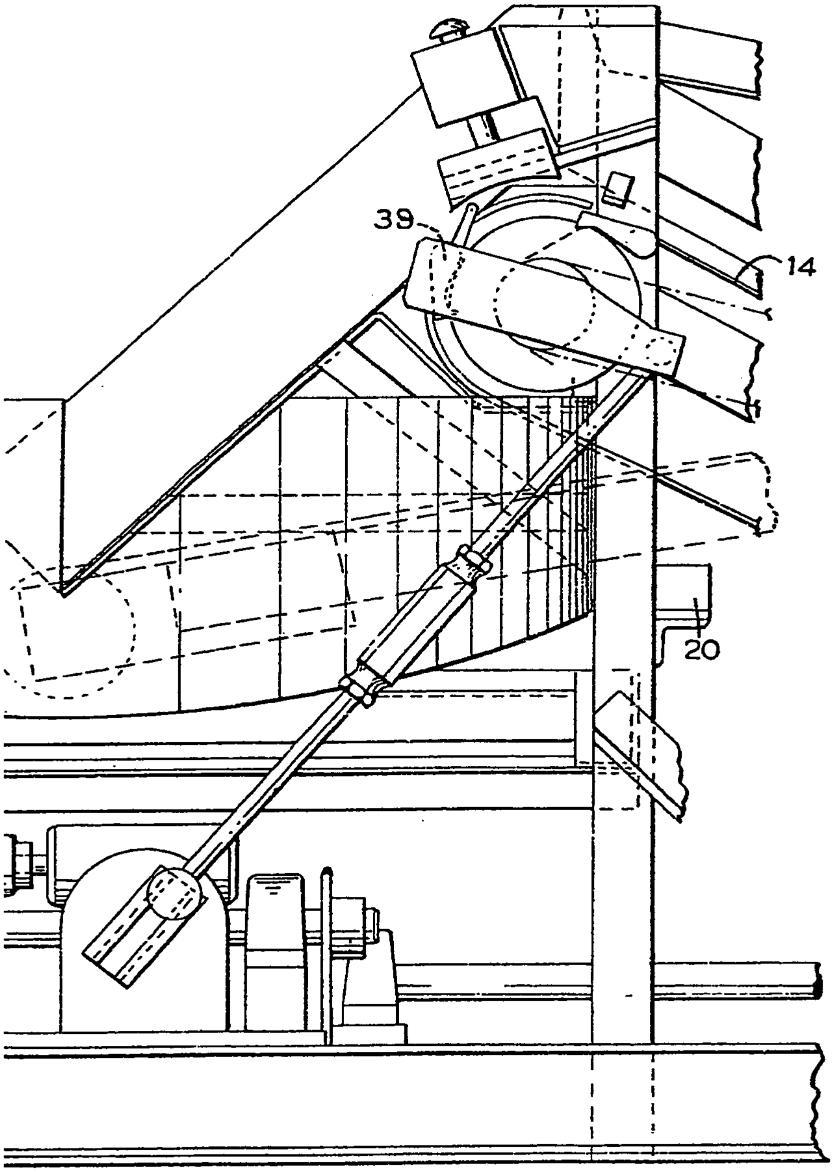
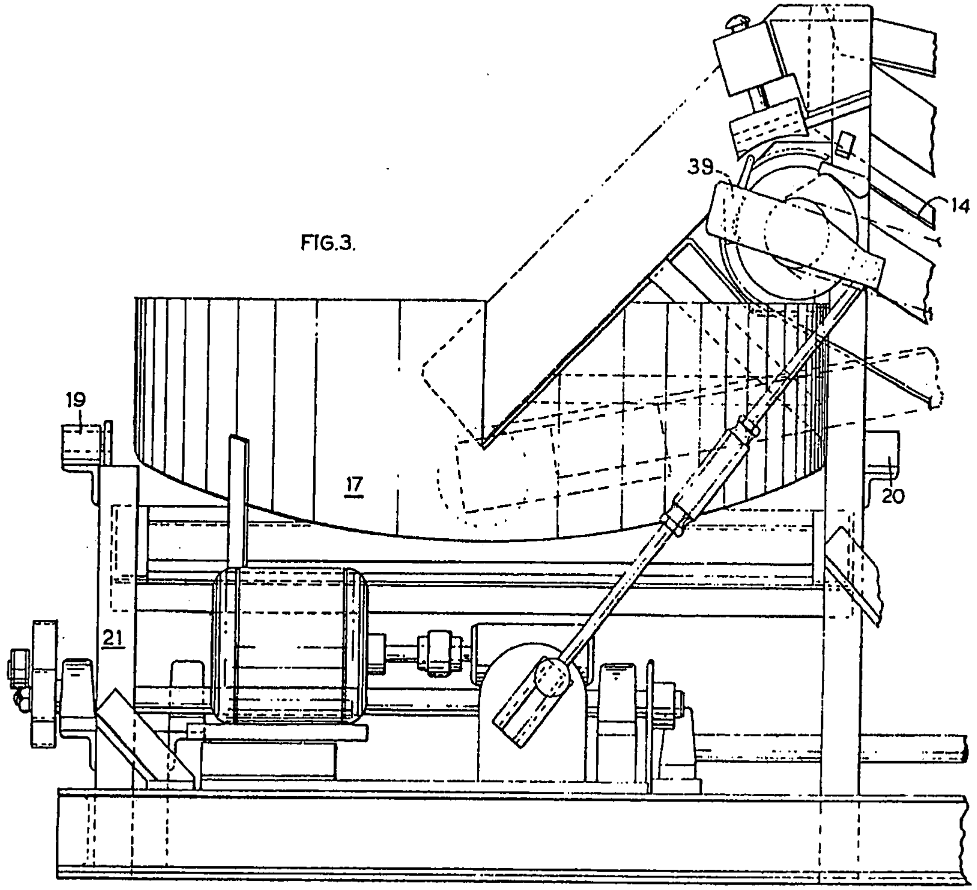


FIG.3.



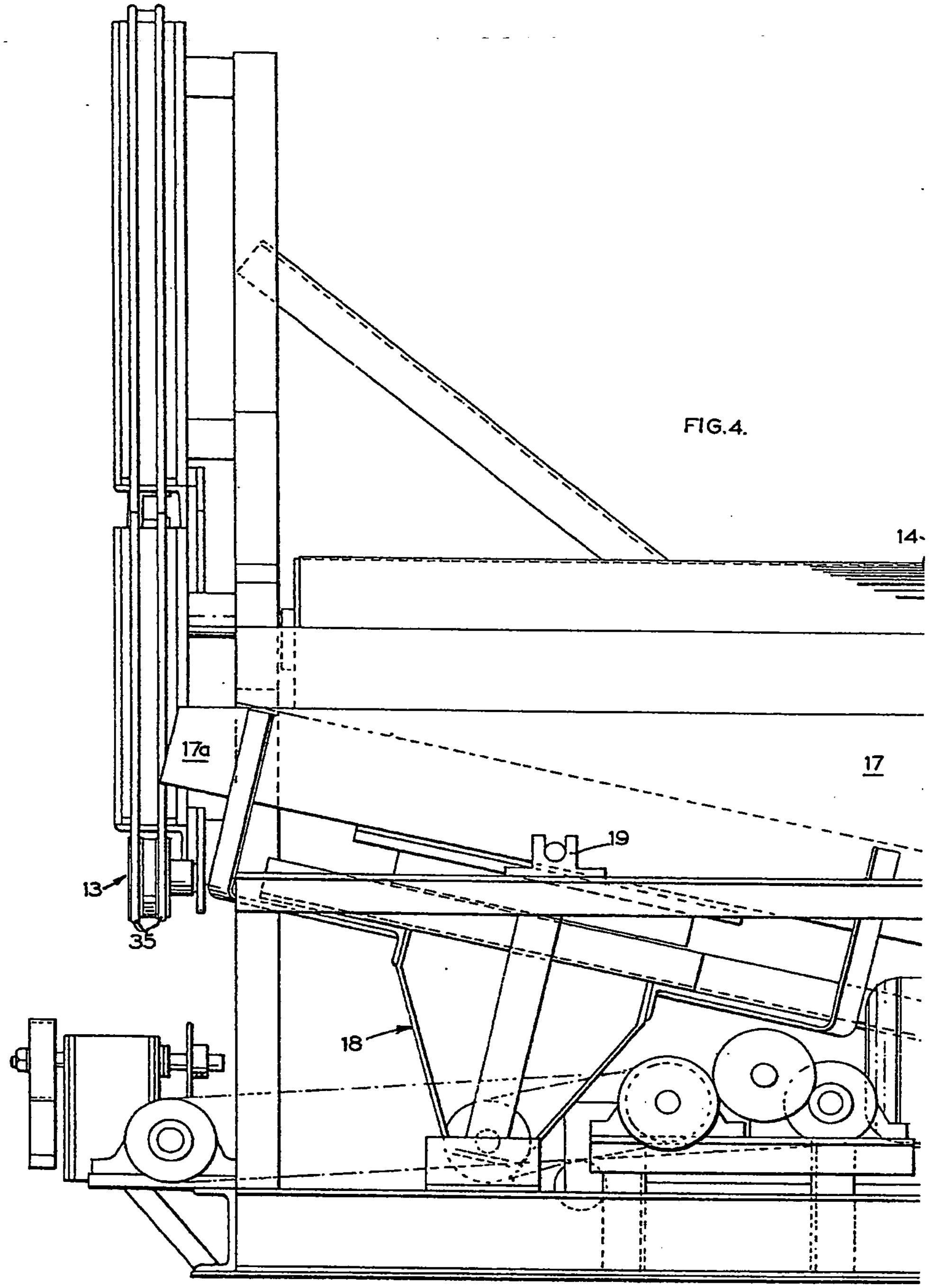
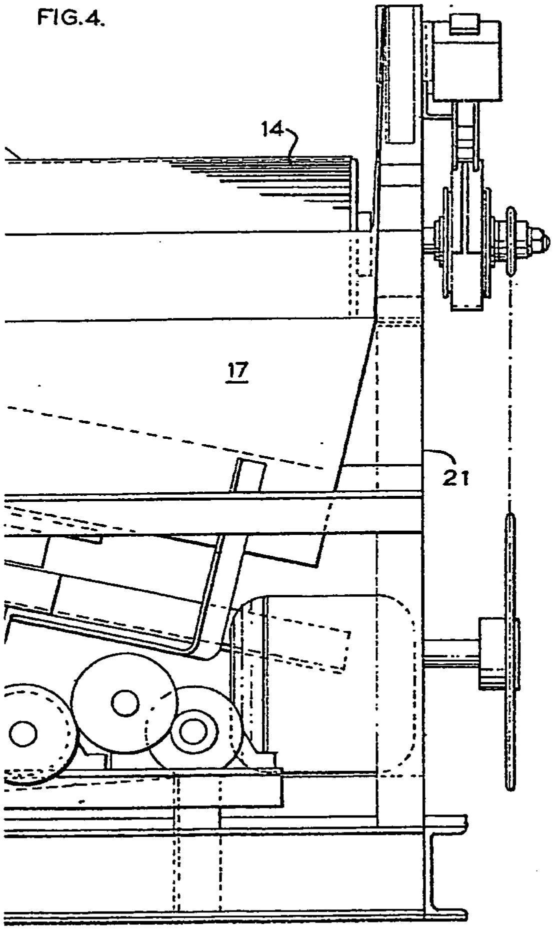


FIG.4.

957,161 COMPLETE SPECIFICATION
5 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*
SHEET 4

FIG.4.



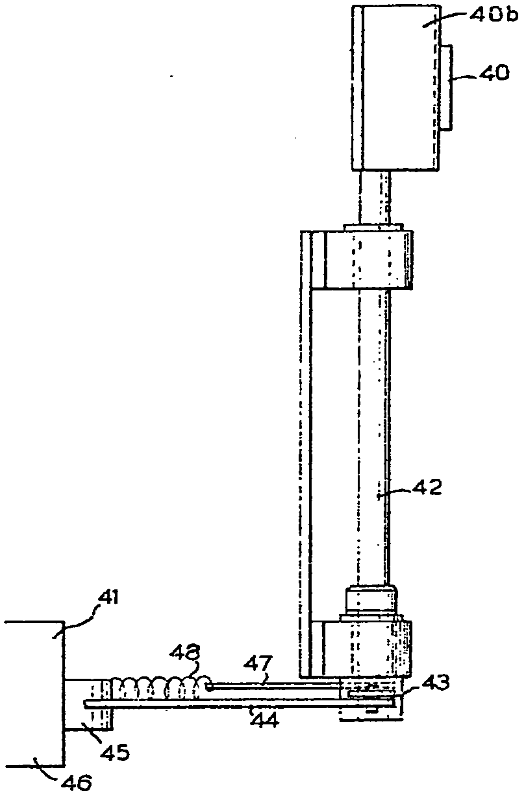


FIG.6.

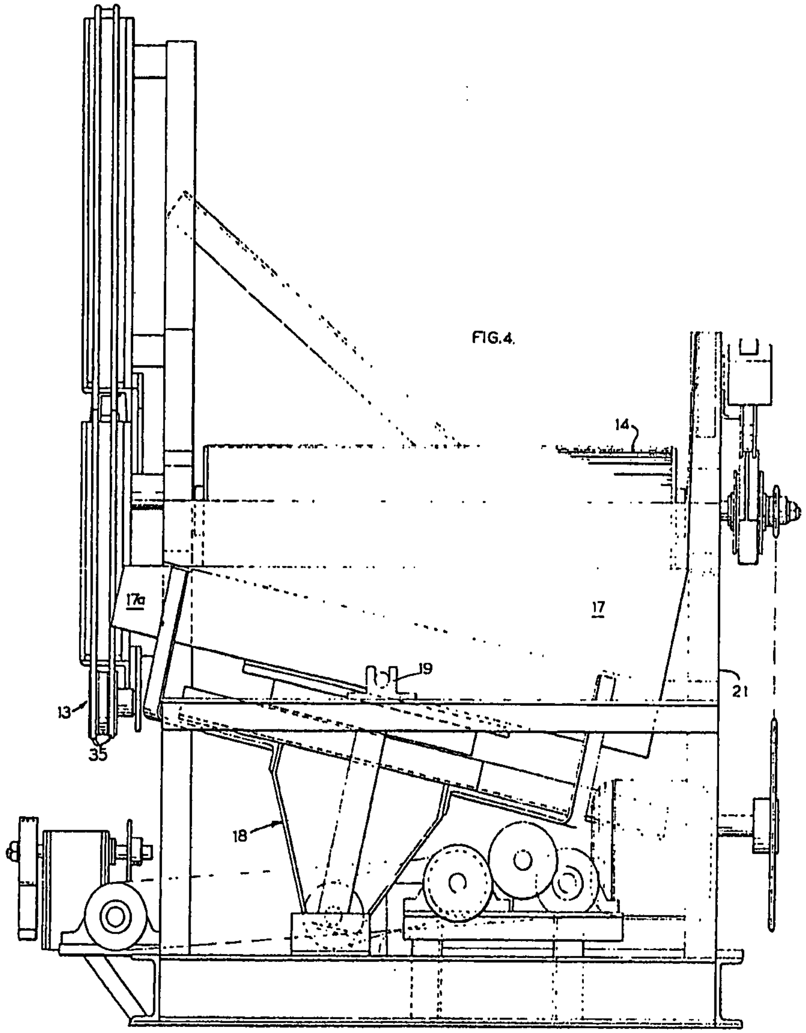


FIG.4.

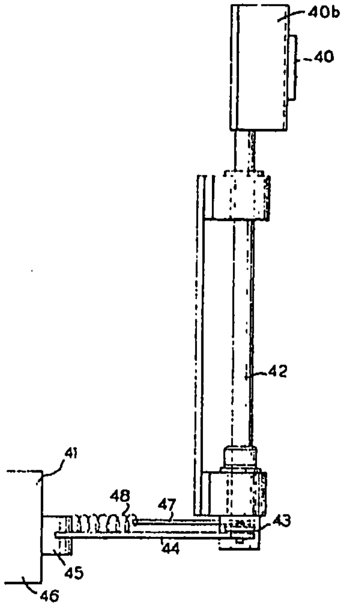
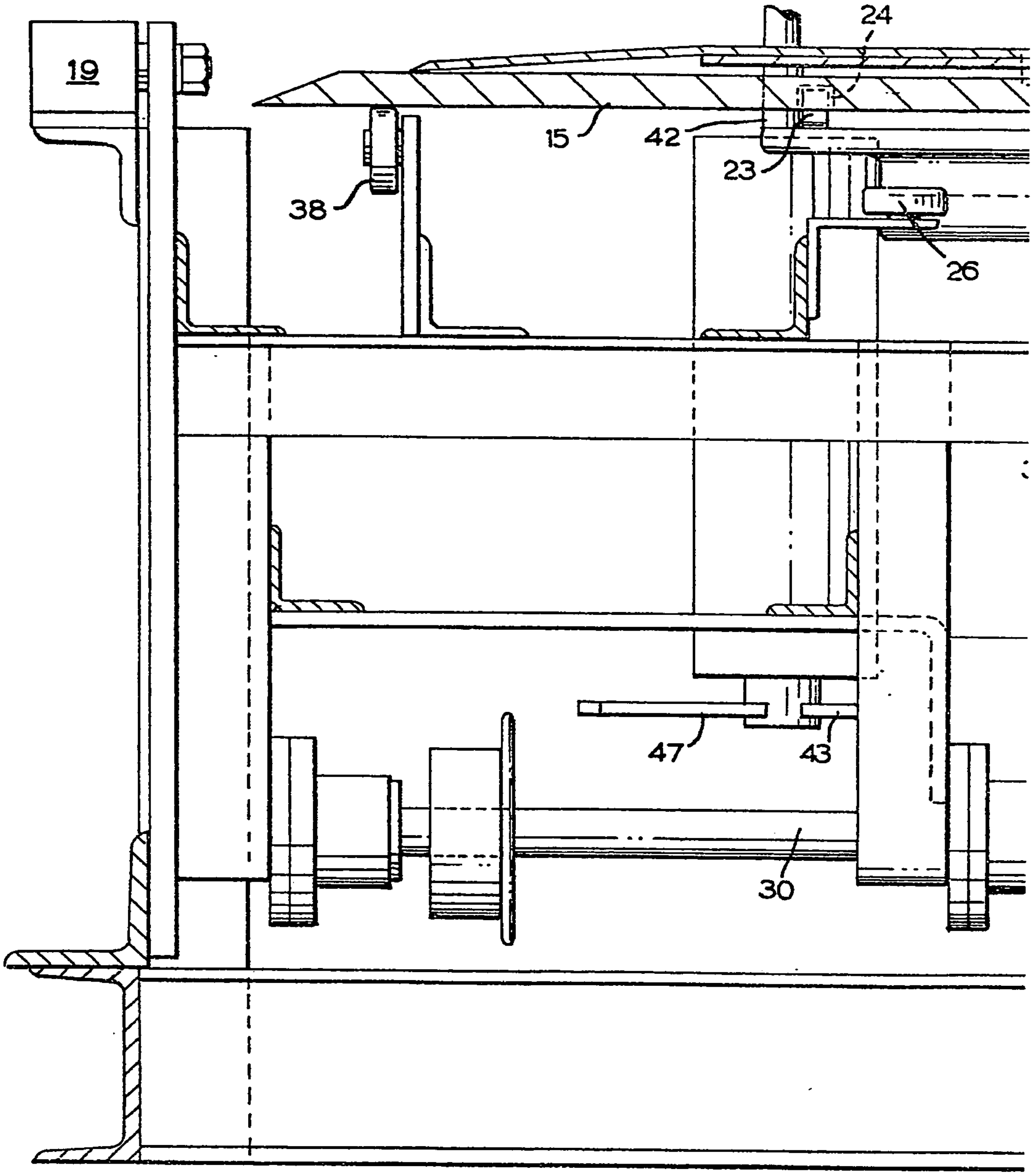


FIG6



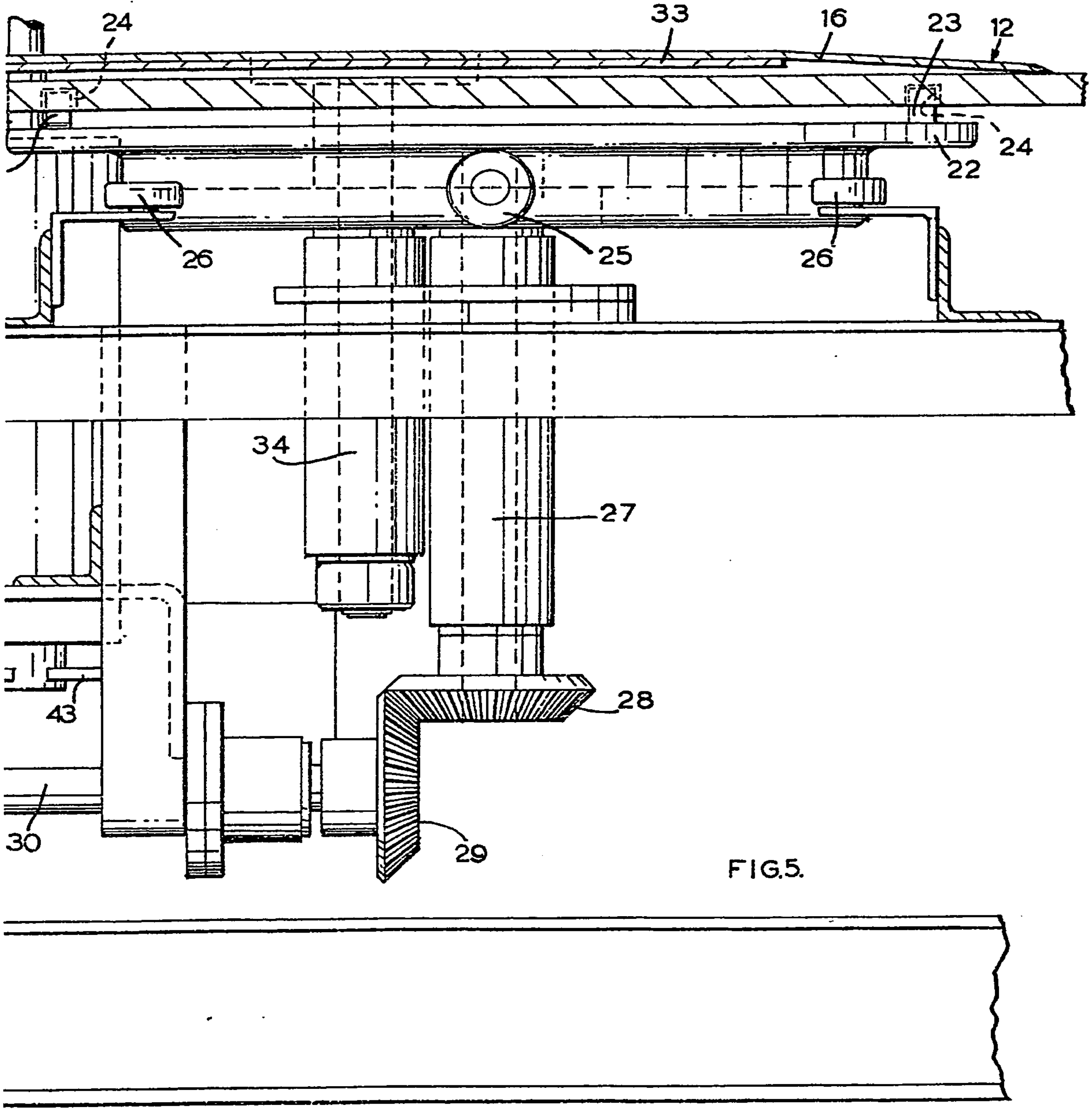


FIG.5.

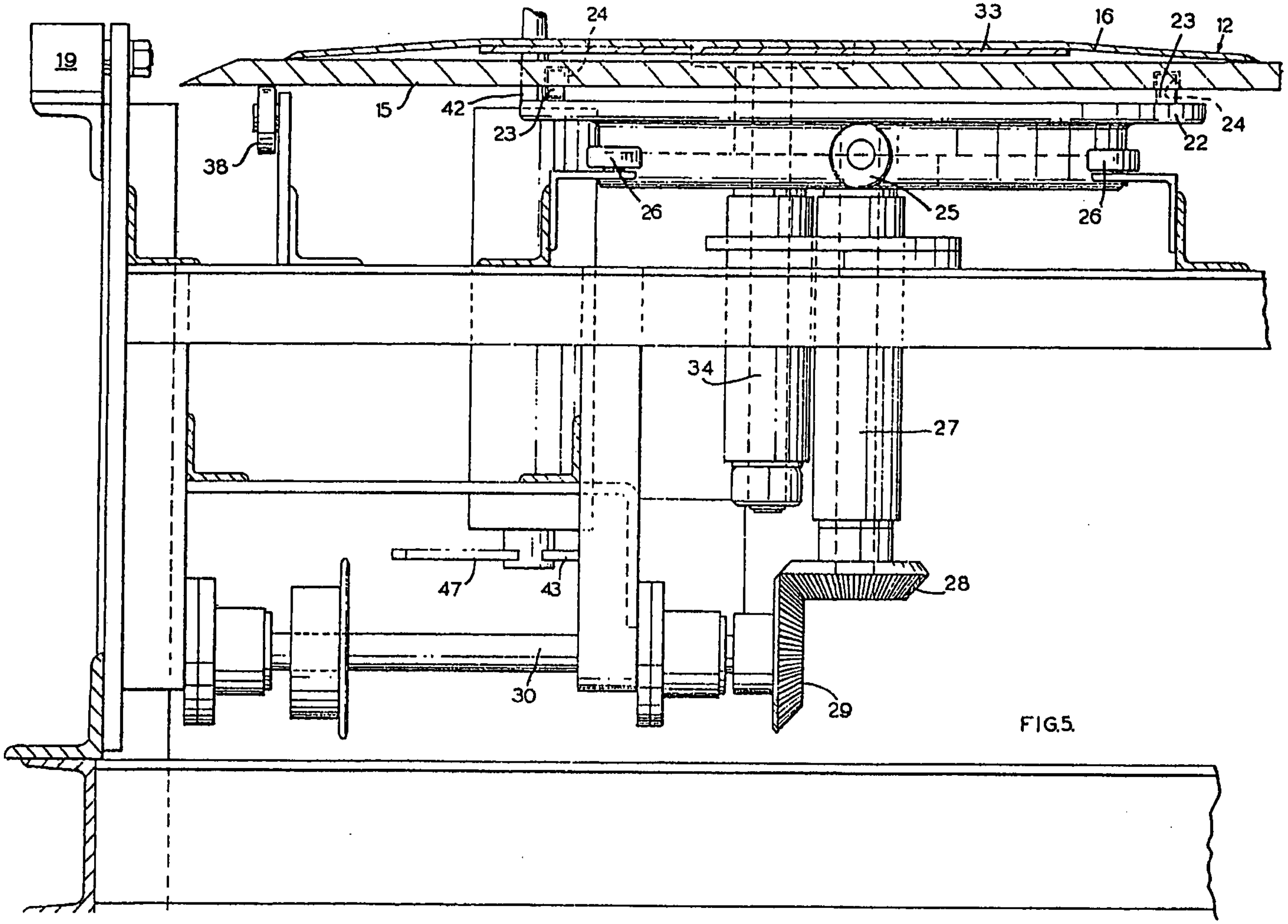


FIG.5.